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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/657,037	09/08/2003	Bor Z. Jang		1106

7590 06/27/2007  
Nanotek Instruments Inc  
9436 Parkside Dr  
Centerville, OH 45458

EXAMINER

ABU ALI, SHUANGYI

ART UNIT	PAPER NUMBER
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1755

MAIL DATE	DELIVERY MODE
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06/27/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

Application No.

10/657,037

Applicant(s)

JANG, BOR Z.

Examiner

Shuangyi Abu-Ali

Art Unit

1755

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 08 September 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 09/08/2003.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

(1)

### *Election/Restrictions*

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims **1-18**, drawn to a photo-electrolytic catalyst system for hydrogen production from water, classified in class 502, subclass 100+.
- II. Claims **19-36**, drawn to a method for converting optical energy into chemical energy to drive a chemical reaction for producing hydrogen gas from an aqueous electrolyte, classified in class 204, subclass 157.15.

The inventions are distinct, each from the other because of the following reasons:

Inventions II and I are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another and materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the process as claimed can be practiced by another and materially different apparatus such as an electrolysis cell comprising an anode, a cathode and an external power source.

Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are independent or distinct for the reasons given

Art Unit: 1755

above and there would be a serious burden on the examiner if restriction is not required because the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

During a telephone conversation with Bor Z. Jang on May 31, 2007 a provisional election was made with traverse to prosecute the invention of Group I, claims **1-18**. Affirmation of this election must be made by applicant in replying to this Office action. Claims **19-36** are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

(2)

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 4-8 and 10-17 are rejected under 35 U.S.C. 102(b) as being anticipated by U. S. Patent No.4, 650,558 to Frank.

Regarding claim 1, Frank discloses a catalyst system comprising a semiconductor material and a catalyst. The semiconductor material is selected from III-V compound, which has a non-zero energy gap Eg. The semiconductor material is electronic contact with the catalyst. (Col. 8, line 59-col. 9, line 13; col. 9, line 46); col. 4, lines 45).

Art Unit: 1755

Regarding claims 2 and 10-11, Frank discloses that the size of the catalyst particle is in the range of 2-300 nm (col. 7, lines 19 and 20).

Regarding claim 4, Frank discloses that the catalyst is a redox enhancer (col. 7, line 13).

Regarding claim 5, Frank discloses that the semiconductor material is an II-IV compound (col. 8, line 64).

Regarding claim 6, Frank discloses the semiconductor material has a band gaps between 0.5 and 3.0 ev (col. 8, line 62).

Regarding claim 7, Frank discloses the catalyst material is rhenium (col. 7, line 22).

Regarding claim 8, Frank discloses that catalyst material is a transition metal (col. 7, line 21).

Regarding claim 12, Frank discloses the semiconductor is a combination of more than one band gap n-type materials (col. 8, line 33-34).

Regarding claims 13 -15, Frank discloses that the semiconductor is a combination of n-type and p-type materials. The different band gap materials layer renders the absorption of different wavelength of light (col. 8, line 29-38).

Regarding claims 16-17, Frank discloses the catalyst used in combination form in the catalyst system (col. 7, lines 24 and 25).

(3)

Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by U. S. Patent No. 4,544,470 to Hetrick et al.

Art Unit: 1755

Regarding claims 1 and 3, Hetrick discloses a catalyst system comprising a semiconductor material and a catalyst. The porous semiconductor material layer is on the surface of the catalyst (col. 2, lines 54 and 59).

(4)

Claims 1, 9 and 17-18 are rejected under 35 U.S.C. 102(b) as being anticipated by U. S. Patent No. 4,623,437 to Visca et al.

Regarding claims 1 and 9, Visca et al. disclose a catalyst system comprising a semiconductor material and a redox catalyst on the surface of the semiconductor material (col. 2, line 20 and col.3 line 36).

Regarding claims 17 and 18, Visca et al. disclose that a combination of a reduction catalyst and an oxidation catalyst renders a high yield redox reaction (col. 2, lines 60-63).

(5)

### ***Conclusion***

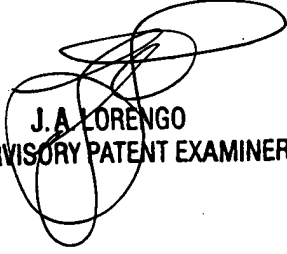
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Such prior art is listed on PTO-892 C- G and I-L. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shuangyi Abu-Ali whose telephone number is 571-272-6453. The examiner can normally be reached on Monday - Friday.

Art Unit: 1755

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jerry Lorengo can be reached on 571-272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SA

  
J. A. LORENGO  
SUPERVISORY PATENT EXAMINER